

Summary Minutes of the Clean Air Scientific Advisory Committee (CASAC) Particulate Matter Review Panel Public Meeting
August 25, 2003, 8:30 AM – 5:30 PM & August 26, 2003 8:30 AM – 2:30 PM
EPA Campus, Building C, Main Auditorium (Room C111),
Research Triangle Park, North Carolina

Panel Members: See Panel Roster – Appendix A.

Date and Time: Monday, August 25, 2003, 8:30 AM – 5:30 PM;
Tuesday, August 26, 2003, 8:30 AM – 2:30 PM

Location: EPA Campus, Building C, Main Auditorium (Room C111)
109 Alexander Drive,
Research Triangle Park, North Carolina

Purpose: The purpose of this meeting was for the CASAC Particulate Matter (PM) Review Panel (“Panel”) to conduct a peer review of the EPA Air Quality Criteria Document (AQCD) for Particulate Matter (Fourth External Review Draft)

Attendees: Chair: Dr. Philip Hopke

CASAC Members: Dr. Frederick Miller
Mr. Richard Poirot
Dr. Frank Speizer
Dr. Sverre Vedal
Dr. Barbara Zielinska

CASAC Members
not present: Dr. George Taylor

Consultants: Dr. Allan Legge
Dr. Paul Liroy (8/26 only)
Dr. Morton Lippmann
Dr. Joe Mauderly
Dr. Roger McClellan
Dr. Gunter Oberdorster
Dr. Robert Rowe
Mr. Ronald White
Dr. Warren White
Dr. George Wolff

Consultants
Not present: Dr. Jane Keonig
Dr. Petros Koutrakis
Dr. Jonathan Samet

EPA SAB Staff: Mr. Fred Butterfield, DFO
Dr. Vanessa Vu, SAB Staff Office Director

Others attending:

Cass Andary, Alliance of Automobile Manufacturers
John Bachmann, U.S. EPA, OAQPS
Brian Baldwin, Southern Co.
Andrew Ballard, Bio-Medical Applications of North Carolina (BMA)
Tim Benner, U.S. EPA, ORD
Ann Brown, U.S. EPA, ORD, NHEERL
Cristina Cann, Health Effects Institute (HEI)
Jeanette Clute, Ford Motor Company
Susan Collett, Toyota Technical Center
Dan Costa, U.S. EPA, ORD, NHEERL
Kathy Coutros, U.S. EPA, ORD, NERL
Charles Darwin, U.S. EPA
Shelly Eberly, U.S. EPA, ORD, NERL
Robert Fegley, U.S. EPA, ORD
Jay Garner, U.S. EPA, ORD, NCEA
Nash Gerald, U.S. EPA, OAQPS
Barbara Glenn, U.S. EPA, ORD, NCERQA
Thomas Grahame, U.S. DOE
Les Grant, U.S. EPA, ORD, NCEA
Dan Greenbaum, HEI
Mary Harmon, U.S. EPA, OAQPS
Victor Hasselblad, Duke University Medical Center
Jon Heuss, Air Improvement Resource (AIR), Inc.
Marion Hoyer, U.S. EPA, OTAQ
Kyle Isakower, American Petroleum Institute (API)
Bryan Hubbell, U.S. EPA, OAQPS
Phil Johnson, Northeast States for Coordinated Air Use Management (NESCAUM)
Pat Kinney, Columbia University
Dennis Kotchmar, U.S. EPA, ORD, NCEA
John Langstaff, U.S. EPA, OAQPS
Charles Lewis, U.S. EPA, OIG
Fred Lipfert, private citizen
Karen Martin, U.S. EPA, OAQPS
Tom McCurdy, U.S. EPA, ORD, NERL
Douglas McKinny, U.S. EPA, ORD, NRML
David Menotti, Shaw Pittman
Michael B. Meyer, Rupperecht and Patashnick, Albany, NY
Andy Miller, U.S. EPA, ORD, NRML
Suresh Moolgavkar, Sciences International
Lucas Neas, U.S. EPA, ORD, NERL
Joseph Pinto, U.S. EPA, ORD, NCEA
Harvey Richmond, U.S. EPA, OAQPS
Mary Ross, U.S. EPA, OAQPS
Bill Russo, U.S. EPA, ORD, NHEERL

Vicki Sandiford, U.S. EPA, OAQPS
Rich Scheffe, U.S. EPA, OAQPS
Mark Shanis, U.S.EPA, OAQPS
Deborah Shprentz, American Lung Association (ALA)
Steve Silverman, U.S. EPA, OGC
Linda Smith, California Air Resources Board (CARB)
Susan Stone, U.S.EPA, OAQPS
Joe Suchecki, Engine Manufacturers Association (EMA)
David Svendsgaard, U.S. EPA, ORD, NCEA
George Thurston, New York University (NYU) School of Medicine
John Vandenberg, U.S. EPA, ORD, NCEA
Ferdinand Venditti, Albany [N.Y.] Medical College
Jim Vickery, U.S. EPA, ORD, NERL
Tim Watkins, U.S. EPA, ORD, NERL
William Wilson, U.S. EPA, ORD, NCEA
Ron Wyzga, Electric Power Research Institute
Gerald Yamada, O'Connor & Hannan, LLP
Bob Yuhnke, Environmental Defense
Roy Zweidinger, U.S. EPA, ORD, NERL

Meeting Summary

Discussion at this meeting generally followed the issues and timing as presented in the meeting agenda (Appendix B).

Monday, August 25, 2003

Convene Meeting, Attendance, Introduction and Administration

Mr. Fred Butterfield, Designated Federal Officer (DFO) for the CASAC, opened the meeting and welcomed those present on behalf of the Agency. He noted that the CASAC is a Federal Advisory Committee chartered under the Federal Advisory Committee Act (FACA) to provide advice and recommendations to the EPA Administrator. Consistent with FACA requirements, its deliberations are held as public meetings for which advance notice is given in the *Federal Register*. The DFO is present at all such meetings to assure compliance with FACA requirements. Minutes and a transcript were recorded for this meeting. The minutes will be certified by the Panel Chair and made available on the SAB website. However, the Agency cannot certify the accuracy of transcripts. All Panel members have submitted financial conflict of interest information, which was reviewed for any appearance of lack of impartiality.

Mr. Butterfield reviewed meeting logistics and introduced the CASAC Chair, Dr. Phil Hopke. All members of the CASAC PM Review Panel introduced themselves as well.

Dr. Vanessa Vu, SAB Staff Office Director, thanked the Chair and members of the CASAC PM Review Panel for their time, commitment, and continued efforts in providing sound advice to the

EPA Administrator regarding updating the AQCD for particulate matter. Dr. Vu also thanked the Agency staff who produced the fourth external review draft of the AQCD for PM.

Purpose of Meeting

Dr. Phil Hopke, CASAC Chair, noted that the purpose of the meeting was for the Panel to review the two-volume, June 2003 draft document, *Fourth External Review Draft EPA Air Quality Criteria for Particulate Matter* (EPA/600/P-99/002, aD, bD). This is the fourth CASAC review of the draft AQCD for PM in the current cycle for reviewing the National Ambient Air Quality Standards (NAAQS) for PM.

Dr. John Vandenberg, Acting Associate Director for Health of EPA's National Center for Environmental Assessment (NCEA) offered brief opening remarks in which he welcomed the members of the Panel and thanked them for their ongoing efforts and contributions.

Overview Presentation on EPA's 4th Revised Draft Air Quality Criteria Document for PM

Dr. Les Grant, Director of NCEA-RTP (EPA/ORD/NCEA) gave a chapter-by-chapter overview presentation on the revisions to the AQCD for particulate matter which are contained in the 4th External Review Draft. In particular, he summarized the statistical-modeling issues that were identified after release of the 3rd External Review Draft of the AQCD for PM, and noted that NCEA has incorporated into this current draft PM AQCD the results or outcomes of peer-reviewed analyses of a number of epidemiological studies conducted to address these issues, and has also made other revisions in response to comments from the Panel as well as members of the public.

Public Comment Period

Eleven members of the public offered twelve separate sets of public comments on the 4th Revised Draft Air Quality Criteria Document for PM (see Appendix C). The public comment period included some brief question-and-answer exchanges among the public speakers, members of the CASAC PM Review Panel, and EPA staff.

CASAC PM Review Panel Discussion and Deliberations

The Panel conducted a chapter-by-chapter review of the 4th Revised Draft AQCD for PM. (In addition, CASAC PM Review Panelists provided individual comments that are compiled in the appendices to the Panel's report associated with this meeting, *i.e.*, the Clean Air Scientific Advisory Committee (CASAC) Particulate Matter (PM) Review Panel's Review of the Agency's *Fourth External Review Draft of Air Quality Criteria for Particulate Matter (June 2003)* (EPA-SAB-CASAC-LTR-04-002). This report is posted on the SAB Web page at the following URL: <http://www.epa.gov/sab/pdf/casac104002.pdf>. These individual Panel member comments have also been provided to the NCEA staff to aid them in the revision process.

Chapter 1 (Introduction)

The Panel deliberated only briefly before closing on Chapter 1. The only major concern expressed with regard to this chapter is that it does not clearly articulate what some Panelists see as the Agency's basic requirements with respect to NAAQS standard-setting, including discussion of indicator, averaging time, level, and statistical form of each standard. A discussion of these standard elements would focus the reader on some of the key issues in the AQCD for PM that will ultimately need to be addressed by EPA's Office of Air Quality Planning and Standards (OAQPS) in the Staff Paper, based in large measure on the scientific understanding of PM as represented in the AQCD. The panel closed on this chapter given that these editorial changes will be incorporated into a final version of the AQCD. During this portion of the meeting, some Panelists also expressed their concerns with respect to the ponderous overall size of this version of the PM AQCD.

Chapter 2 (Physics, Chemistry, and Measurement of Particulate Matter)

The PM Review Panel closed on Chapter 2. However, individual Panelists provided a small number of minor corrections and comments which are found in the appendices to the Panel's report.

Chapter 3 (Concentrations, Sources, and Emissions of Atmospheric Particulate Matter)

The Agency introduced a new approach to the estimation of "background" in Chapter 3 of the 4th Revised Draft to the AQCD for PM. This precipitated a lengthy discussion among Panelists as to what constituted policy-relevant background pollutant concentrations. In summary, the Panel continued to express concerns regarding the dual problems of estimating the concentrations of pollutants that are advected into the atmosphere of North America and providing a lower limit on the concentrations that can be effectively managed. Nevertheless, the PM Review Panel agreed that the approach that EPA presented in the revised document was reasonable and could serve as a good basis for making such background estimations that were likely to be possible at this time. However, the Panel also noted that any resulting estimates would have a very high degree of uncertainty. Panelists provided other minor corrections and comments in their individual comments. The Panel closed on Chapter 3 with the understanding that these corrections and comments will be incorporated into the final AQCD.

Chapter 4 (Environmental Effects of Airborne Particulate Matter)

The PM Review Panelists assessed that the Agency has made considerable improvements in the sections of this Chapter associated with ecosystem impacts, climate change and the valuation of welfare effects. However, the chapter could be further improved to be more consistent with the other chapters in terms of clearly providing information necessary to estimate the risks of PM exposure at or near ambient levels — although one Panel member commented that the "major overhaul" with respect to adverse ecosystem effects should come in the next iteration of the AQCD for PM and ozone. However, another Panelist noted that the "uncertainties [are] due to the complexities," adding that PM is only one pollutant that is resulting in these adverse impacts and that there is "not sufficient attribution with respect to PM alone" which would support the setting of a secondary standard for PM in the same manner as, for example, ozone or carbon monoxide. This same member also cited the merit of the approach of European countries in

using the concept of “critical [pollutant] loads” in estimating the adverse effects of pollutants, while the current approach followed by the U.S. “does not adequately address the issue of the cumulative effects of pollutants on the environment” — and the “pollutant mixture” in particular.

Panelists expressed that concerns remained about the chapter’s visibility section, in which a number of inconsistencies were identified in the review of the Third External Review Draft of the PM AQCD but have not yet been fully addressed in this revision. Specifically, it was noted that one of the best understood relationships is that the extinction coefficient is proportional to the mass concentration for a given particle mix; however, this fundamental understanding is not clearly presented. There is also an inconsistency in the document in that optical measurements are reported as a means to estimate particulate mass concentrations, but it appears not to give credence to the use of mass measurements to estimate optical properties. Moreover, visibility in Class 1 areas is already dealt with in the Regional Haze rules process, while visibility issues remain in other areas that were not addressed at all in this document.

The PM Review Panel requested that the Agency staff review the individual comments on this topic in both this report as well as the report submitted in 2002 summarizing the Panel’s review of the Third External Review Draft AQCD for PM. Nevertheless, the Panel felt it could close on this chapter on the basis of the revisions already incorporated and the additional modifications that will be made in response to the individual comments which are provided in the appendices to the Panel’s associated report.

Chapter 5 (Human Exposure to Particulate Matter and its Constituents)

[Chapter 5 was discussed during the second day of the meeting (see page 7 below) since the lead review Panelist for this chapter, Dr. Paul Lioy, was only able to attend the meeting on Tuesday, August 26.]

Chapter 6 (Dosimetry of Particulate Matter)

The Panel commented that Chapter 6 has been greatly improved in this version of the PM AQCD as compared to the Third External Review Draft. In addition, Panel members acknowledged that material on the comparison of dosimetry in laboratory animals versus humans that assists in the interpretation of toxicological effects and their potential relevance to effects in humans had been added to this chapter. In addition, detailed information has been incorporated on regional and total respiratory tract deposition as a function of age for various particle sizes. Nonetheless, one Panel member noted that a “major area” that has still not been addressed in this revision to the PM AQCD that had been specifically requested by the Panel pertains “to presenting dosimetry calculations for various real-world exposure scenarios,” both short- and long-term. In addition, the Panel found some technical errors in the chapter that will require careful revisions.

The PM Review Panel agreed that an appropriate approach to resolve these issues was for Panelist and CASAC Member Dr. Fred Miller to work directly with NCEA staff to ensure that the appropriate modifications were made. However, the Panel felt it could otherwise close on Chapter 6 subject to the typical regular minor revisions that are necessary to address the Panel member individual comments and suggestions, as provided in the appendices of the associated Panel report.

Chapter 7 (Toxicology of Particulate Matter in Humans and Laboratory Animals)

The Panel was not able to come to closure on Chapter 7 because of a number of problems that they identified. Specifically, it was felt that the authors of this chapter often strained to make the case for biologic plausibility despite the very high doses of particles used in comparison to real-world human exposures; however, not as often does the chapter state that caution is needed in interpreting the results for humans. Therefore, the Panel urged the authors to achieve a better balance in the statements for support of the epidemiological results arising from some of the studies described in Chapter 7.

Other problems that the Panel judged to exist with this revision of Chapter 7 include: (1) the inconsistent treatment of doses across the chapter, with doses, or exposure concentrations and times, given for some studies but not for others (a point has been raised repeatedly in previous CASAC PM Panel reviews); (2) an absence of various dose metrics presented for human to rat ratios, in order to facilitate interspecies extrapolation of animal toxicology results; (3) apparent confusion between exposures to diesel emissions and exposures to diesel particulate matter; (4) failure to satisfactorily deal with the issue of the presence of endotoxin in airborne particulate matter; (5) an overall extremely weak treatment of bioaerosols, with some Panel members noting that the presence of allergens and other biological particles in the atmosphere is an important part of the scientific understanding of the relationships between exposure to ambient particulate matter and health effects and has to be appropriately reflected in this chapter; and (6) major inadequacies with the “summary and conclusions” section at the end of the chapter (Section 7.7).

Tuesday, August 26, 2003

Chapter 5 (Human Exposure to Particulate Matter and its Constituents)

The Panel noted that Chapter 5 had been very substantially improved, with one Panelist remarking that the chapter represented “a thorough and balanced discussion of the human exposure issues relevant” to PM. The Panel also commended NCEA for the inclusion of an important section on the relevancy of exposure assessment to epidemiology and toxicology.

While the Panel commented that the chapter could still be more concise and better focused, it was judged to provide an important perspective requested by the Panel. The chapter in general and the aforementioned section in particular could be improved with some careful editing to shorten and focus the discussions (including moving some material to Chapter 9, “Integrative Synthesis”). The Panel closed on Chapter 5 with the understanding that the remaining issues that are found in the individual Panel members comments would be addressed by the Agency in the final document with modest editorial changes.

Chapter 8 (Epidemiology of Human Health Effects Associated with Ambient Particulate Matter)

This chapter in the Third External Review Draft of the AQCD for PM was not formally reviewed in 2002 because of the concern over statistical issues associated with generalized additive models (GAMs). In general, the PM Review Panel felt that the Agency made substantial improvement in this current revision to Chapter 8. The Panel was impressed that the chapter is not taking an advocacy position to convince the reader of a certain point of view, and there is a more balanced

review and appraisal of the relevant literature. In addition, the Fourth External Review Draft PM AQCD does do a better job of attaining the “goal of producing an objective appraisal of the evidence, including weighing of alternative views on controversial issues.” Additionally, while there is some “unevenness” of the tone (which is possibly reflective of the patchy nature of the revisions), this can be corrected with a careful, comprehensive editing of Chapter 8 that pays particular attention to this issue.

However, the Panel noted that there are still significant issues remaining that NCEA will need to address. The most important of these are summarized as follows:

(1) With regard to the content of Chapter 8 and the thread of argument to be used to present the epidemiological results, the Panel suggested that there be more a more explicit statement of what the state of knowledge is regarding air pollution and health effects, noting that PM exists as a component of a complex pollution mixture that includes other criteria pollutants, as well as many other airborne contaminants that may convey risks to health. Therefore, in interpreting the findings of multi-pollutant models, there are several alternative explanations for observed associations that need to be considered, and yet which are not clearly stated in the PM AQCD. The Panel comments that the document would be advanced by a clear delineation of these relationships rather than the current general statements about residual confounding.

(2) The discussion in this chapter needs to be clarified so that the direct effects of gaseous pollutants are properly included. In addition, there is some inconsistency in how the role of gaseous pollutants in a given study is presented.

(3) The PM Review Panel felt that issues regarding the impact of use of the default convergence criterion in GAMs have been reasonably well-handled. The Panel felt that it should be noted that, although studies using generalized linear models (GLMs) were not plagued by poor model convergence, effect estimates from these studies may be as sensitive to degree of temporal smoothing and specification of weather as any study that used GAMs.

(4) There does not appear to be any general review in the text of new/revised findings of single-city mortality studies. Accordingly, the Panel requested that a brief discussion of their contribution to the weight-of-the-evidence be included.

(5) The Panel judged that the presentation and discussion of studies of chronic PM effects is reasonably balanced and indicates issues (such as that of spatial correlations) that are not fully resolved and model sensitivities. However, the relationship between spatial correlation and confounding is confusing. Specifically, while accounting for spatial correlation is important, adequately accounting for it does not provide assurance that effect estimates are unconfounded.

(6) As an example of what some Panel members felt was an unfortunate tendency in the AQCD for PM to selectively summarize results, the Panel noted that the results of the reanalyses of respiratory hospitalizations did not substantially affect conclusions.

(7) Members of the Panel questioned the statement in the document that: “The time-series studies published since 1996 have all controlled adequately for weather influences,” noting that concerns remain as to how to control for meteorology and other time-related potentially confounding factors and adding that the sensitivity of findings to weather specification is again an active area of work. In addition, some Panel members expressed concern about reporting only “best lags.”

(8) The Panel discussed the issue of criteria for including more recently-published papers remains (*e.g.*, the paper by Hoek *et al.* on Dutch mortality), noting that it may be that papers that help clarify cross-chapter issues are the ones that rise to the level of inclusion. In addition, the Panel remarked that some important recent “intervention” studies, notably the Dublin and Hong Kong mortality studies, were not included in Chapter 8, which is unfortunate, since these have direct relevance to the PM AQCD, and like most “intervention” studies, avoid some of the weaknesses of the other types of observational studies reviewed.

(9) The Panel noted that the discussion of heterogeneity of effect estimates in the HEI-funded National Morbidity, Mortality and Air Pollution Study (NMMAPS) is misleading, and sometimes incorrect. Panelists noted that the issue of heterogeneity is particularly important, and that it is still a very open question.

Accordingly, the Panel could not close on this important chapter.

Chapter 9 (Integrative Synthesis) & Executive Summary

The Panel judged Chapter 9 to be inadequate in that it only offered a recapitulation of specific details and did not constitute a true “integrative synthesis” that brought together the information presented in the preceding chapters in a way that provides a clear and concise description of what is known regarding particulate matter and associated adverse health and welfare effects. While one Panel member commented that Chapter 9 is “arguably the most important chapter of the document,” another Panelist remarked that this chapter simply “continues to be an iteration of the summary points from previous chapters” in this revision to the AQCD for PM.

However, rather than revising this chapter, *per se*, it was suggested to start over with an entirely different perspective based on a set of “integrating questions” that would serve to initiate the subsequent discussions. The NCEA staff was asked to formulate those questions into an outline for the chapter. A teleconference was scheduled for October 3, 2003, at which time the Panel would provide a consultation on proposed questions, which would then serve as the basis for rewriting Chapter 9. [Note: This teleconference was, in fact, held that day, and the Panel discussed and generally concurred on the restructured framework presented by the Agency.]

Members of the Panel offered a wide range of views on the document’s Executive Summary — from being moderately satisfied that it did, in fact, integrate and summarize the large volume of complex information in the AQCD to suggestions that it was too detailed and in some cases, too elementary. The Panel assessed that there were clearly significant inconsistencies in how the various topics were treated, and therefore that significant revision to the Executive Summary would be needed. However, it was felt that the development of a truly integrative synthesis chapter should then provide a much better basis for extracting the key information from the PM AQCD and presenting it in the Executive Summary. Therefore, the Panel concluded that the combination of the comments provided by Panelists and being able to think afresh about the nature of the Executive Summary based on a new Chapter 9 should provide an appropriate path toward a suitable summary for the Fourth External Review Draft of this document.

Summary, Wrap-up, Next Steps and Closing Remarks

A joint Clean Air Scientific Advisory Committee and CASAC Particulate Matter Review Panel teleconference is scheduled for October 3, 2003 for the: (1) CASAC's review of and deliberation on the CASAC National Ambient Air Monitoring Strategy (NAAMS) Subcommittee report; and (2) CASAC PM Review Panel's discussion of follow-on matters related to its review of the Fourth External Review Draft of the AQCD for PM — and specifically, the discussion of the 'framework questions' leading to the restructuring of Chapter 9, "Integrative Synthesis."

Additionally, the next face-to-face meeting of the CASAC PM Review Panel will be scheduled for November 12 and 13 in Research Triangle Park for the Panel to: (1) discuss follow-on matters related to its ongoing peer review of Fourth External Review Draft of the PM AQCD; and (2) conduct a peer review of *the Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information (OAQPS Staff Paper – First Draft)* and a related draft technical report, *Particulate Matter Health Risk Assessment for Selected Urban Areas (Draft Report)*.

Action Items:

- Dr. Les Grant will draft a set of "framework questions" which will be used to guide the restructuring of Chapter 9 ("Integrative Synthesis") of the PM AQCD. These will be sent to all Panelists by the last week of September 2003.
- Dr. Grant's office will provide additional materials for Chapter 6 ("Dosimetry") to the Panel's designated reviewer, Dr. Fred Miller, as soon as these are available.
- A joint CASAC and CASAC PM Matter Review Panel teleconference will be planned for October 3, 2003.
- A CASAC PM Matter Review Panel face-to-face will be planned for November 12 & 13, 2003 in Research Triangle Park, NC.

Respectfully Submitted:

Certified as True:

*/Signed/**/Signed/*

Fred A. Butterfield, III
CASAC DFO

Philip Hopke, Ph.D.
CASAC Chair

APPENDICES

Appendix A:	Roster of the CASAC Particulate Matter Review Panel
Appendix B:	Meeting Agenda
Appendix C:	List of Public Speakers

Appendix A – Roster of the CASAC Particulate Matter Review Panel

**U.S. Environmental Protection Agency
Science Advisory Board (SAB) Staff Office
Clean Air Scientific Advisory Committee
CASAC Particulate Matter Review Panel***

CHAIR

Dr. Philip Hopke, Bayard D. Clarkson Distinguished Professor, Department of Chemical Engineering, Clarkson University, Potsdam, NY

Also Member: Research Strategies Advisory Committee
Executive Committee

CASAC MEMBERS

Dr. Frederick J. Miller, Vice President for Research, CIIT Centers for Health Research, Research Triangle Park, NC

Mr. Richard L. Poirot, Environmental Analyst, Air Pollution Control Division, Department of Environmental Conservation, Vermont Agency of Natural Resources, Waterbury, VT

Dr. Frank Speizer, Edward Kass Professor of Medicine, Channing Laboratory, Harvard Medical School, Boston, MA

Dr. George E. Taylor, Professor and Assistant Dean, School of Computational Sciences, George Mason University, Fairfax, VA

Dr. Sverre Vedal, Professor of Medicine, National Jewish Medical and Research Center, Denver, CO

Dr. Barbara Zielinska, Research Professor, Division of Atmospheric Science, Desert Research Institute, Reno, NV

CONSULTANTS

Dr. Jane Q. Koenig, Professor, Department of Environmental Health, School of Public Health and Community Medicine, University of Washington, Seattle, WA

Dr. Petros Koutrakis, Professor of Environmental Science, Environmental Health, School of Public Health, Harvard University (HSPH), Boston, MA

Dr. Allan Legge, President, Biosphere Solutions, Calgary, Alberta

Dr. Paul J. Liroy, Associate Director and Professor, Environmental and Occupational Health Sciences Institute, UMDNJ - Robert Wood Johnson Medical School, NJ

Dr. Morton Lippmann, Professor, Nelson Institute of Environmental Medicine, New York University School of Medicine, Tuxedo, NY

Dr. Joe Mauderly, Vice President, Senior Scientist, and Director, National Environmental Respiratory Center, Lovelace Respiratory Research Institute, Albuquerque, NM

Dr. Roger O. McClellan, Consultant, Albuquerque, NM

Dr. Gunter Oberdorster, Professor of Toxicology, Department of Environmental Medicine, School of Medicine and Dentistry, University of Rochester, Rochester, NY

Dr. Robert D. Rowe, President, Stratus Consulting, Inc., Boulder, CO

Dr. Jonathan M. Samet, Professor and Chair, Department of Epidemiology, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD

Mr. Ronald White, Research Scientist, Epidemiology, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD

Dr. Warren H. White, Visiting Professor, Crocker Nuclear Laboratory, University of California - Davis, Davis, CA

Dr. George T. Wolff, Principal Scientist, General Motors Corporation, Detroit, MI

SCIENCE ADVISORY BOARD STAFF

Mr. Fred Butterfield, CASAC Designated Federal Officer, 1200 Pennsylvania Avenue, NW, Washington, DC, 20460, Phone: 202-564-4561, Fax: 202-501-0582, (butterfield.fred@epa.gov) (FedEx: Fred A. Butterfield, III, EPA Science Advisory Board (1400A), Ariel Rios Federal Building North, Suite 6450, 1200 Pennsylvania Ave., NW, Washington, DC, 20004, Tel.: 202-564-4561)

* Members of this SAB Panel consist of:

a. SAB Members: Experts appointed by the Administrator to serve on one of the SAB Standing Committees; and

b. SAB Consultants: Experts appointed by the SAB Staff Director to a one-year term to serve on ad hoc Panels formed to address a particular issue.

Appendix B – Meeting Agenda

**U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee (CASAC)
Particulate Matter (PM) Review Panel**

**Public Meeting & Teleconference
Monday, August 25, 2003 – 8:30 am to 5:30 pm Eastern Time
Tuesday, August 26, 2003 – 8:30 am to 5:30 pm Eastern Time**

**EPA campus – Main Auditorium (Building C), Room C111-C
Research Triangle Park (RTP) North Carolina**

Final Agenda for Review of EPA's 4th Revised Draft Air Quality Criteria Document (AQCD) for Particulate Matter

Monday, August 25, 2003

8:30 am	Convene Meeting; Call Attendance; Introductions and Administration; and Overview of Meeting Agenda	Mr. Fred Butterfield, CASAC DFO
8:45 am	Welcome & Opening Remarks	Dr. Vanessa Vu, EPA Science Advisory Board (SAB) Staff Office Director
8:50 am	Purpose of Meeting	Dr. Phil Hopke, Chair
8:55 am	Welcome from EPA's National Center for Environmental Assessment (NCEA)	Dr. John Vandenberg, Acting Associate Director for Health, NCEA
9:00 am	Overview Presentation on EPA's 4th Revised Draft AQCD for Particulate Matter	Dr. Les Grant, Director, NCEA-RTP
10:00 am	Break*	
10:15 am	Public Comment Period	Mr. Butterfield (Facilitator)
11:00 am	Begin CASAC PM Review Panel Discussion and Deliberations	Dr. Hopke, PM Review Panel Members
12:00 pm	Lunch (Cafeteria)	

*Note: Periodic breaks will be taken as necessary and at the call of the Chair.

Monday, August 25, 2003 (Continued)

1:00 pm	CASAC PM Review Panel Discussion and Deliberations (Continued)	Dr. Hopke, PM Review Panel Members
5:15 pm	Summary, Wrap-Up and Next Steps	Dr. Hopke
5:30 pm	Adjourn Meeting for the Day	Mr. Butterfield

Tuesday, August 26, 2003

8:30 am	Reconvene Meeting; Call Attendance	Mr. Butterfield
8:35 am	Re-cap of Previous Day's Meeting	Dr. Hopke
8:45 am	Additional NCEA/RTP Comments	Dr. Grant
8:50 am	Continue CASAC PM Review Panel Discussion and Deliberations	Dr. Hopke, PM Review Panel Members
12:00 pm	Lunch (Cafeteria)	
1:00 pm	CASAC PM Review Panel Discussion and Deliberations (Continued)	Dr. Hopke, PM Review Panel Members
4:30 pm	Public Comment Period	Mr. Butterfield (Facilitator)
5:00 pm	Summary, Wrap-Up, Next Steps and Closing Remarks	Dr. Hopke
5:30 pm	Adjourn Meeting	Mr. Butterfield

Appendix C – List of Public Speakers

List of Public Speakers

**U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee (CASAC)
Particulate Matter (PM) Review Panel Meeting**

**Review of the 4th External Review Draft of
Air Quality Criteria Document (AQCD) for Particulate Matter**

August 25-26, 2003

**EPA campus – Main Auditorium (Building C), Room C111-C
Research Triangle Park (RTP), North Carolina**

#	Speaker's Name	Organizational Affiliation	Organization(s) Represented
1	Dr. Dan Greenbaum	Health Effects Institute (HEI)	same
2	Ms. Deborah Shprentz	Consultant	American Lung Association (ALA)
3	Mr. Bob Yuhnke	Consultant	Environmental Defense (ED)
4	Mr. Philip Johnson	Northeast States for Coordinated Air Use Management (NESCAUM)	same
5	Mr. Frederick Lipfert	Consultant	Alliance of Automobile Manufacturers (AAM)
6	Mr. Frederick Lipfert	Consultant	none (private citizen)
7	Dr. Linda Smith	California Air Resources Board (CARB)	same
8	Dr. Ron Wyzga	Electric Power Research Institute (EPRI)	same
9	Dr. Suresh Moolgavkar	Consultant	Sciences International, Inc.
10	Mr. Jon Heuss	Air Improvement Resource, Inc. (AIR)	General Motors (GM)
11	Mr. Gerald H. Yamada	O'Connor & Hannan, LLP	multiple (coalition of companies)
12	Dr. Ferdinand Venditti	Albany [NY] Medical College	Engine Manufacturers Association (EMA)